Claims:

1. An heat-resistant and impact resistant container obtained by heat-molding a sheet provided with a thermoplastic polyester layer comprising chiefly an ethylene terephthalate unit, and having a flange portion, a barrel portion and a closed bottom portion, the wall of the barrel portion being oriented and crystallized so as to possess a crystallinity of not smaller than 15% as measured by the density method, and the wall of the barrel portion being oriented to satisfy the following formulas (1), (2) and (3),

$$Iu(-110)/Iu(010) \leqq 1.02 \quad \text{---}\ (1)$$

$$IL(-110)/IL(010) \leqq 0.89 \quad \text{---}\ (2)$$

and

$$(Iu(-110)/Iu(010)) - (IL(-110)/IL(010)) \geqq 0.13 \quad \text{---}\ (3)$$

wherein Iu(-110) is a diffraction intensity of the surface having an index of a plane of (-110) in the upper part of the wall of the barrel portion of when an X-ray is incident on the wall surface of the container perpendicularly thereto and when the axial direction of the container is regarded to be a perpendicular of the optical coordinate, Iu(010) is a diffraction intensity of the surface having an index of a plane of (010) in the upper part of the wall of the barrel portion of when an X-ray is incident on the wall surface of the container perpendicularly thereto and when the axial direction of the container is regarded to be a perpendicular of the optical coordinate, IL(-110) is a diffraction intensity of the surface having an index of a plane of (-110) in the lower part of the wall of the barrel portion of when an X-ray is incident on the wall surface of the container perpendicularly thereto and when the axial

direction of the container is regarded to be a perpendicular of the optical coordinate, and IL(010) is a diffraction intensity of the surface having an index of a plane of (010) in the lower part of the wall of the barrel portion of when an X-ray is incident on the wall surface of the container perpendicularly thereto and when the axial direction of the container is regarded to be a perpendicular of the optical coordinate,

as measured by the X-ray diffraction by using a curved PSPC microdiffractometer.

2. An impact resistant container according to claim 1, wherein the ratio (H/R) of the height (H) of the barrel portion to the inner diameter (R) at the top of the barrel portion is not smaller than 0.8.

3. An impact resistant container according to claim 1 or 2, wherein the flange portion has a crystallinity of smaller than 10% as measured by the density method.

4. An impact resistant container according to claim 1 or 2, wherein the flange portion has a crystallinity of not smaller than 20% as measured by the density method.

5. A method of producing an impact resistant container by heating a sheet provided with an amorphous thermoplastic polyester layer comprising chiefly an ethylene terephthalate unit at a sheet temperature (Ts) that satisfies the following formula (4),

$$Tg < Ts < Tg + 50^\circ C \quad \text{--- (4)}$$

wherein Tg is a glass transition point of the thermoplastic polyester,

and molding and heat-setting the sheet by using a plug having a bottom area of not smaller than 70% of the bottom area of the container and a plug temperature (Tp) that satisfies the following formula (5),

$$Tg - 30^\circ C < Tp \leqq Tg + 30^\circ C \quad \text{--- (5)}$$

wherein Tg is the glass transition point of the

thermoplastic polyester,

in one step or in two steps in a metal mold with a plug-assisted compressed air or vacuum.

6. A production method according to claim 5, wherein the metal mold has a temperature (Tm) that satisfies the following formula (6),

$$Tg \leqq Tm \qquad --- (6)$$

wherein Tg is a glass transition point of the thermoplastic polyester.

7. A production method according to claim 5 or 6, wherein said plug has a stepped shoulder for forming a flange.

8. A method of producing a heat resistant resin container by molding a thermoplastic resin sheet by using the compressed air into the shape of a female mold that is heated at a temperature not lower than the crystallization temperature of said resin, and reducing the pressure in the molded article so as to shrink into the shape of a plug having the shape of a final container to impart the shape thereto, followed by cooling.

9. A method of producing a heat resistant resin container according to claim 8, wherein a primary molded article obtained by stretching a thermoplastic resin sheet by using a plug, is molded with the compressed air.

10. A method of producing a heat resistant resin container according to claim 8 or 9, wherein the thermoplastic resin sheet is an amorphous sheet of a thermoplastic polyester.

11. A method of producing a heat resistant resin container according to any one of claims 8 to 10, wherein the surface area of the plug is not smaller than 3 times as great as the to-be-molded area of the thermoplastic resin sheet.

12. A method of producing a heat resistant resin container according to any one of claims 8 to 11, wherein

the temperature of the plug is not lower than a glass transition point of the thermoplastic resin but is not higher than the temperature of the female mold.

13. A method of producing a heat resistant resin container according to any one of claims 8 to 12, wherein an intermediate article obtained by stretch-molding the thermoplastic resin sheet by using a plug for stretch-molding prior to effecting the molding with the compressed air, is molded with the compressed air and is shrunk in a separate step by being supported by a plug for imparting the shape.

14. A method of producing a heat resistant resin container according to claim 13, wherein the temperature of the plug for imparting the shape is lower than a glass transition point of the thermoplastic resin.

15. A heat-resistant resin container obtained by molding a thermoplastic polyester sheet, at least the side wall of the container being oriented and crystallized due to stretching, and the crystallinity being larger on the outer surface than the crystallinity on the inner surface in every portion of the container.

16. A container according to claim 15, wherein said container has a flange portion, a side wall portion and a bottom portion, and the ratio (H/D) of the height (H) of the container to the diameter (D) of the container is not smaller than 0.5.

17. A container according to claim 16, wherein the flange portion of the container is cloudy and the side wall is transparent when it contains no pigment.

18. A container according to any one of claims 15 to 17, wherein a change in the volume of the container is not larger than 1.0% after it is heat-treated in an oven at such a temperature that the side wall portion thereof is maintained at 90°C for 3 minutes.

19. A method of producing a heat-resistant container

by preparing an intermediate article by heat-shrinking a pre-molded article obtained by solid-phase-molding the sheet provided with an amorphous thermoplastic polyester layer, molding the intermediate product with the compressed air in a female metal mold for final molding heated at a temperature not lower than the crystallization start temperature of said polyester, heat-setting the molded article, reducing the pressure inside the molded article so that the molded article shrinks along the outer surface of the plug having the shape of the final container to impart the shape thereto, followed by cooling.

20. A method according to claim 19, wherein the sheet is solid-phase-molded by pressing the sheet by using a plug for pre-molding, the sheet being clamped by a clamping metal mold and a female mold for pre-molding, and by supplying the pressurized gas to between the sheet and the plug.

21. A method according to claim 20, wherein in molding the sheet, the sheet temperature is maintained to lie between the glass transition point (Tg) of the thermoplastic polyester + 15°C and the glass transition point + 40°C.

22. A method according to claim 21, wherein the plug is maintained at a temperature between the glass transition point of the thermoplastic polyester - 30°C and the glass transition point + 20°C.

23. A method according to claim 21 or 22, wherein the female mold for pre-molding is maintained at a temperature between the glass transition point of the thermoplastic polyester + 10°C and the glass transition point + 50°C.

24. A method according to any one of claims 19 to 23, wherein the pre-molded article is supported by the plug for intermediate molding and is inserted in the

female mold for intermediate molding, and the molded article is caused to shrink along the outer surface of the plug to impart the shape thereto followed by cooling.

25. A method according to claim 24, wherein the female mold for intermediate molding is maintained at a temperature in a range of not lower than the crystallization start temperature.

26. A method according to claim 24 or 25, wherein the plug for intermediate molding is maintained at a temperature lower than the temperature of the female mold for intermediate molding and in a range of from 80 to 110°C.

27. A method according to any one of claims 19 to 26, wherein the surface area of the pre-molded article is from 1.1 to 1.5 times as large as the surface area of the intermediate article.

28. A method according to any one of claims 19 to 27, wherein the female mold for final molding is maintained at a temperature of not lower than the crystallization start temperature of the thermoplastic polyester.

29. A method according to any one of claims 19 to 28, wherein the plug for the final container is maintained at a temperature in a range of from the glass transition point of the thermoplastic polyester - 20°C to the glass transition point + 20°C.

30. A container having excellent heat resistance and impact resistance obtained by stretching and molding a thermoplastic polyester, the thermoplastic polyester in the bottom portion of the container having a crystallinity of not smaller than 15%, and the center in the bottom portion of the container being substantially transparent and having a distinguished diffraction peak in the surface of an index of a plane (010) in the X-ray diffraction.

31. A container according to claim 30, wherein the

oriented crystallization tendency (U) as defined by the following formula (I),

$$U = H(010)/H(-110) \qquad \text{--- (I)}$$

wherein H(010) is a diffraction intensity of the surface having an index of a plane (010) in the X-ray diffraction, and H(-110) is a diffraction intensity of the surface having an index of a plane (-110) in the X-ray diffraction,

is not smaller than 1.3 at the center in the bottom portion.

32. A container according to claim 30 or 31, wherein the sheet having the thermoplastic polyester layer is stretched and molded in the solid phase.

33. A container according to any one of claims 30 to 32, wherein the crystallinity of the thermoplastic polyester in the side wall of the container is not smaller than 15%.